Using appropriate reinforcement to trigger attention:

The example of horse training.

Céline ROCHAIS[1], Séverine HENRY[1], Sophie BRAJON[1], Carol SANKEY[1], Aleksandra GORECKA-BRUZDA[2] & Martine HAUSBERGER[1]

[1]Université de Rennes 1, UMR CNRS 6552 Ethologie Animale et Humaine
[2]Polish Academy of Sciences, Institute of Genetics and Animal Breeding, Poland

64th Annual meeting of the european federation of animal science
August 26th - 30th 2013, Nantes, France

Introduction: theoretical context

Attentional state: a definition

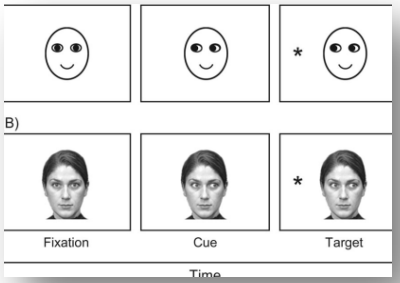
« It is the taking possession by the mind, in clear and vivid form, of one out of what seems several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence.”» (James, 1890).

How does attention look like?

Behavioural and postural adjustments

(gazes, body orientation…)

Sokolov (1960); Cohen (1972); Xitco (2004)



Introduction: applied context

Usual Beliefs

Some horses are less attentive than others!

Intrinsic & **extrinsic** factors?

Breed, Sire, Age

Housing conditions, Human's actions

A supposed impact of attentional state of the working horse on its performance

Lack of scientific knowledge

Introduction : aims

Hypothesis: Attention and learning performances are interrelated?

Do human's actions have an impact?

Previous works showed that humans' actions influence learning performances

Positive primary reinforcement
(*e.g.* food reward)
versus
Negative reinforcement or nothing

→ Promotes learning
Improves human-horse relationships
(short and long term)
(Sankey et al, 2010 a,b,c)

Impact of the type of the reward
- tactile action
- food reward

(Sankey et al, 2010)

general use of tactile stimulation
Wither= Preferred zone of grooming

Are these differences mediated by attention?

Material and Methods

2 studies, 1 method :

Training:
Remain motionless in response to a vocal order
Increasing duration of immobility required
5min/days, 5 consecutive days
(Sankey et *al*, 2010)

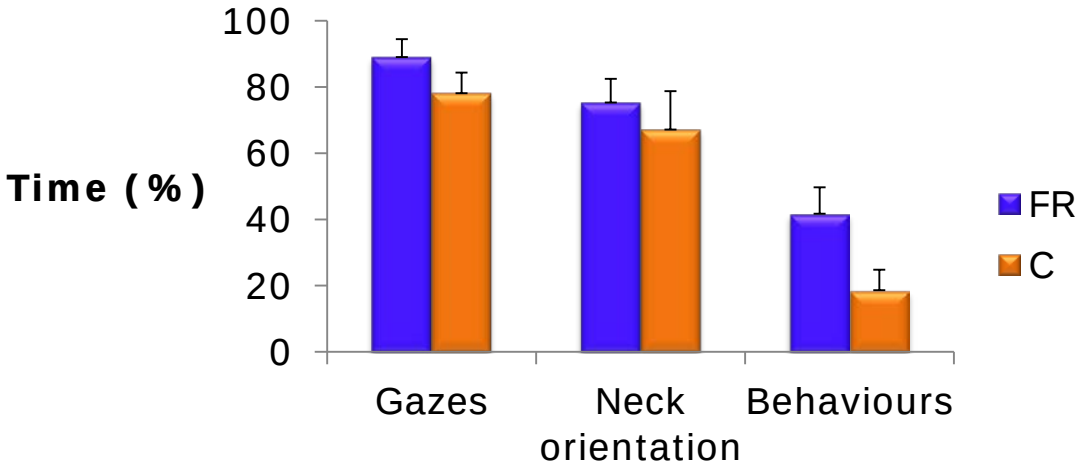
5 sec → 10 sec → 30 sec → 45 sec → 60 sec

Attentional measurements :

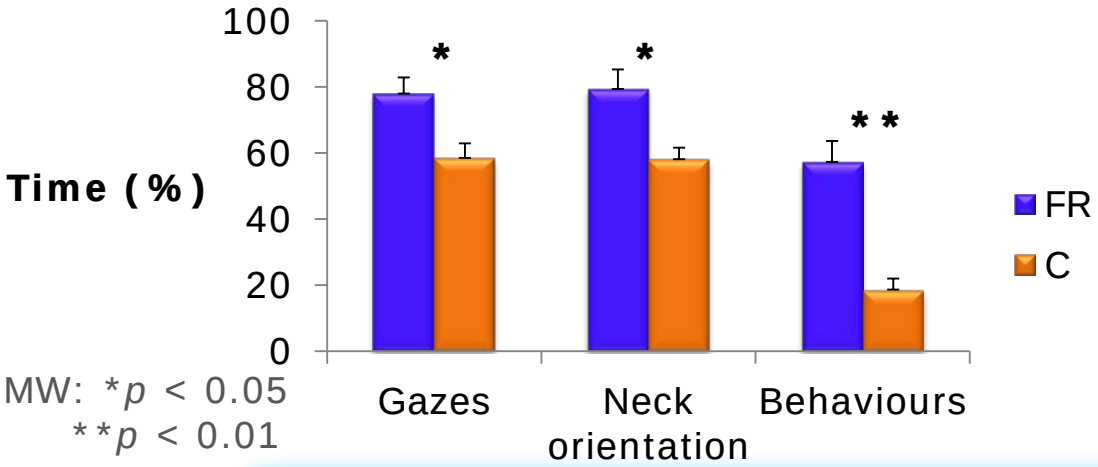
Gaze orientation	Towards the trainer / environment
Neck orientation	Towards the trainer / environment
Behaviours	Towards the trainer (*e.g.* sniffing) « agitated behaviours » (*e.g.* moving forward & backward)

Study 1
Does the use of primary positive reinforcement promote attention?

Attention towards the trainer in D1



Attention towards the trainer in D5



MW: $*p < 0.05$
$**p < 0.01$

N = 15 males
1 year old
Angloarabian breed

FR (N = 8): Food Reward
C (N = 7): Control horses

On the first day, no difference between groups

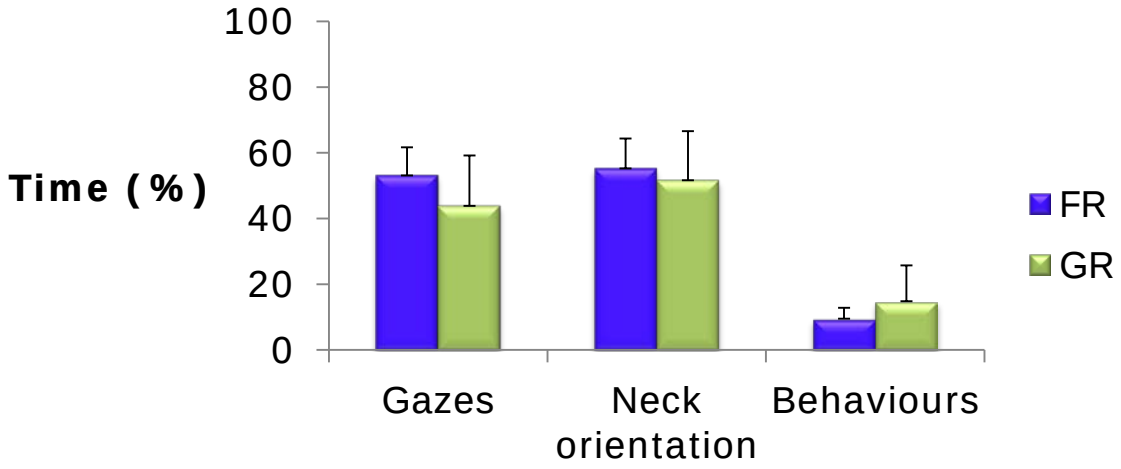
By the end of the training, **Food Rewarded horses** present more postures and behaviours orientated towards the trainer than **Control horses**

YES! The use of primary positive reinforcement promotes attention towards the trainer!

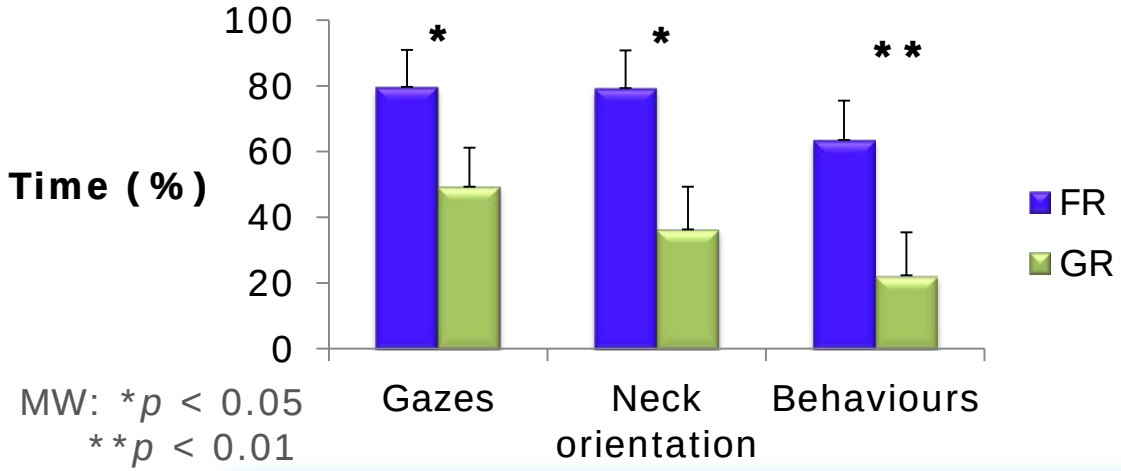
Brajon et al, subm

Study 2
What is the impact of the type of reward?

Attention towards the trainer in D1



Attention towards the trainer in D5

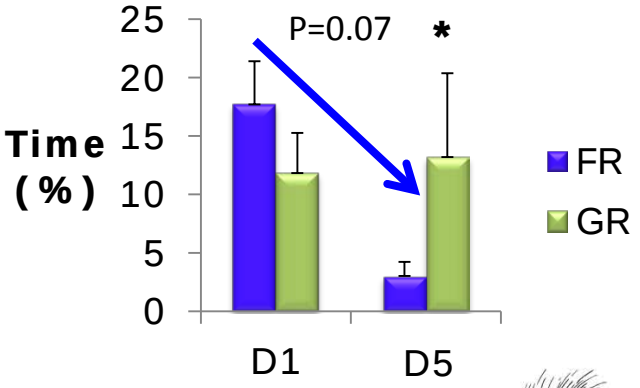


MW: *$p < 0.05$
**$p < 0.01$

N= 15 (6 females ; 9 males)
1 year old
Konik Polski

FR (N=8): Food Reward
GR (N=7): Grooming Reward

Agitated behaviours depending on the day of training



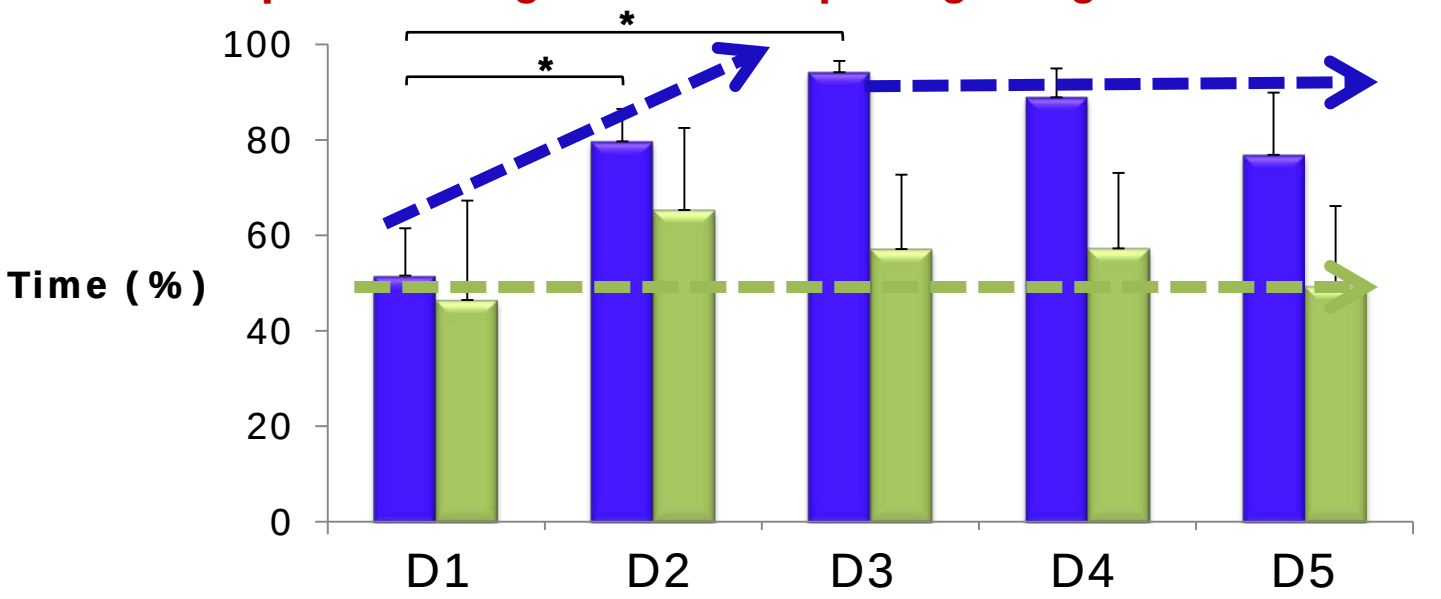
Agitated Behaviours in GR horses

Grooming rewarded horses showed lower attention

Rochais et al, under review

Study 2
What is the impact of the type of reinforcement ?

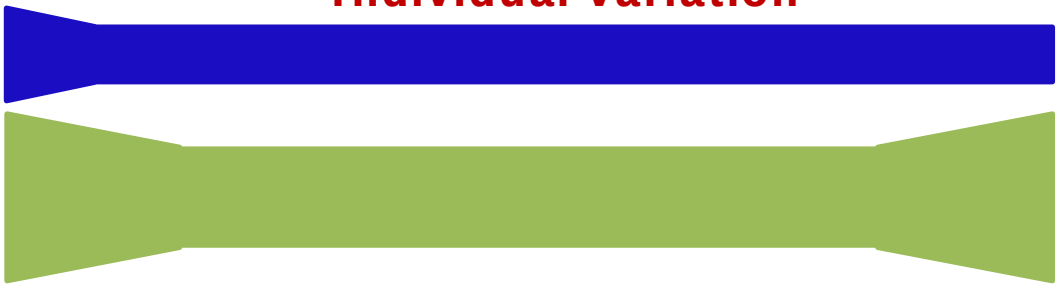
Temporal changes in time spent gazing the trainer



Wilcoxon test:
*$p < 0.05$

Individual variation

Coefficient of Variation



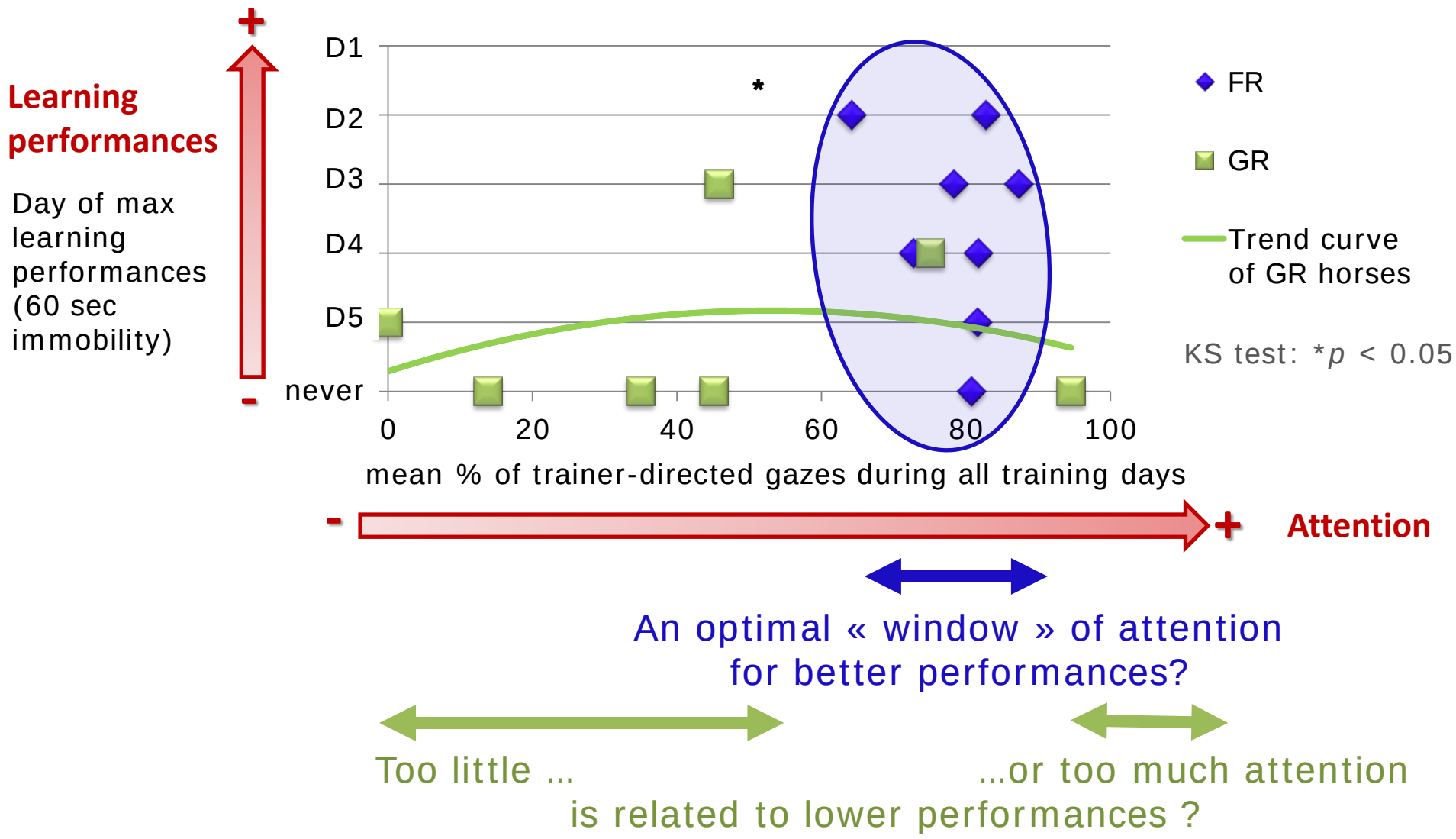
CV (%)	D1	D2	D3	D4	D5
FR	48 %	24 %	7 %	19 %	7 %
GR	92 %	52 %	54 %	55 %	94 %

Rochais et al, under review

Study 2

Could differences in attention explain differences in learning performances?

An interrelation between learning and attention: at the individual level



Rochais et al, under review

General Discussion

Triggering attention and learning performances?

What these studies tell us?

- Impact of human's actions on attentional processes

- The use of positive reinforcement promotes human-directed attention

  → An optimal window of attention that promotes learning

- The type of reward has to be validated by the horse itself

Take home message

Positive reinforcement promotes **attention, learning and hence safety**
Appropriate rewards have to be used!

Conclusion

Further research is needed

Attentive Humans → Attentive Horses

Sankey et *al*, 2011
Fureix et *al*, in prep

? Breed, Age

Training context

Housing conditions

Thank you for your attention!

Acknowledgements

Station expérimentale des Haras Nationaux, Laurence Wimel & staff of Chamberet, France

The Polish Academy of Sciences, Institute of Genetics and Animal Breeding, Popielno, Poland

Colleagues

CNRS, « Région Bretagne » and IFCE for financial support

cnrs dépasser les frontières

Région BRETAGNE

ECOLE NATIONALE d'EQUITATION Le Cadre Noir de Saumur

les Haras nationaux

Institut français du cheval et de l'équitation